

ESS55: Earth's Atmosphere / Homework #4 (due 4/30/2009)**Multiple Choice**

Identify the letter of the choice that best completes the statement or answers the question.

- _____ 1. The surface pressures at the bases of warm and cold columns of air are equal. Air pressure in the warm column of air will _____ with increasing height _____ than in the cold column.
- decrease, more rapidly
 - decrease, more slowly
 - increase, more rapidly
 - increase, more slowly
- _____ 2. If the outside air temperature is 27 °C and the air density is 1.2 kg/m³, the outside air pressure would be:
- 32 mb
 - 93 mb
 - 930 mb
 - 1013 mb
 - 1033 mb
- _____ 3. The scale on an altimeter indicates altitude, but an altimeter actually measures:
- temperature
 - density
 - pressure
 - humidity
- _____ 4. The unit of pressure most commonly found on a surface weather map:
- inches of mercury
 - millibars
 - pounds per square inch
 - atmospheres
- _____ 5. If a liquid with a lower density than mercury were used in a barometer the height of the column in the barometer would:
- increase
 - decrease
 - remain the same
 - not provide an accurate measure of atmospheric pressure
- _____ 6. A station at an altitude of 900 m (about 3000 feet) above sea level measures an air pressure of 930 mb. Under normal conditions, which of the values below do you think would be the most realistic sea level pressure for this station?
- 840 mb
 - 930 mb
 - 1020 mb
 - 1830 mb
- _____ 7. Lines connecting points of equal pressure are called:
- isobars
 - millibars
 - contours
 - isotherms
 - a coordinate grid

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- _____ 8. Pressure changes:
- more rapidly in the horizontal direction than in the vertical
 - more rapidly in the vertical direction than in the horizontal
 - at the same rate in the horizontal and vertical directions
 - more rapidly in the vertical over land than over the ocean.
- _____ 9. On a weather map, ridges are:
- elongated low pressure areas
 - dying hurricanes
 - mountains that stall the movement of storms
 - elongated high pressure areas
 - tornadoes that touch the surface
- _____ 10. If an airplane flies from standard temperature air into warmer than standard temperature air, without making any correction, the altimeter in the warmer air would indicate an altitude:
- higher than the airplane's actual altitude
 - exactly the same as the airplane's altitude
 - lower than the airplane's actual altitude
 - correction factor to be used by the pilot
- _____ 11. On an upper-level chart the wind tends to blow:
- at right angles to the isobars or contour lines
 - parallel to the isobars or contours
 - at an angle between 10 and 30 to the contours and towards lower pressure
 - at constant speed
- _____ 12. On an isobaric weather chart, the spacing of the height contours indicates the magnitude of the pressure gradient force.
- true
 - false
- _____ 13. The Coriolis force is the force that causes the wind to blow.
- true
 - false
- _____ 14. Given the equation for geostrophic wind, $V_g = \frac{1}{2\Omega \sin \phi} \frac{\Delta p}{\rho d}$, increasing the pressure gradient ($\frac{\Delta p}{d}$) will increase the wind speed.
- true
 - false
- _____ 15. The hydrostatic equation describes the equilibrium between the
- friction force and gravity
 - horizontal pressure gradient force and gravity
 - Coriolis force and gravity
 - horizontal pressure gradient force and gravity
 - vertical pressure gradient force and gravity
- _____ 16. Why is there a minus sign in the hydrostatic equation? (The hydrostatic equation is $\Delta p = -\rho g \Delta z$.)
- Because as pressure decreases, gravity increases.
 - Because as pressure decreases, density increases.
 - Because as pressure decreases, height increases.
 - Because as pressure decreases, height decreases.

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- ___ 17. Which of the following forces can not act to change the speed of the wind?
- pressure gradient force
 - frictional force
 - Coriolis force
 - none of the above
- ___ 18. Which of the statements below is not correct concerning the pressure gradient force?
- the PGF points from high to low pressure in the Northern Hemisphere
 - it is non-existent at the equator
 - it can cause the wind to speed up or slow down
 - the PGF points from high to low pressure in the Southern Hemisphere
- ___ 19. Which of the following produces the strongest Coriolis force?
- fast winds, low latitude
 - fast winds, high latitude
 - slow winds, low latitude
 - slow winds, high latitude
- ___ 20. The rate of the earth's rotation determines the strength of the:
- pressure gradient force
 - Coriolis force
 - frictional force
 - gravitational force
- ___ 21. Suppose that the winds aloft are geostrophic and blowing from the north. Low pressure is located to the:
- north
 - south
 - east
 - west
- ___ 22. Suppose that the winds aloft are geostrophic and blowing from the north. With the same orientation of isobars at the surface, the winds would blow from the:
- southwest
 - northwest
 - northeast
 - southeast
- ___ 23. The vertical pressure gradient force is directed
- downward
 - upward
 - horizontally
- ___ 24. A surface LOW pressure area that moves from south to north directly east of your home would most likely produce winds that shift from:
- S to SE to E
 - SE to E to SW
 - N to NE to E
 - W to NW to N
 - NE to N to NW
- ___ 25. The wind around a surface low pressure center in the Southern Hemisphere blows:
- counterclockwise and outward from the center
 - counterclockwise and inward toward the center
 - clockwise and outward from the center
 - clockwise and inward toward the center

Name: _____

- _____ 26. Surface winds blow across the isobars at an angle due to:
- the Coriolis force
 - the pressure gradient force
 - the frictional force
 - the centripetal force
- _____ 27. Winds blow slightly inward:
- around surface low pressure centers in the Northern Hemisphere only
 - around surface low pressure centers in the Southern Hemisphere only
 - around surface low pressure centers in the Northern and Southern Hemispheres.
 - at the poles in both hemispheres
- _____ 28. Cyclonic flow means _____ in either the Northern or Southern Hemisphere.
- clockwise wind flow
 - counterclockwise flow
 - circulation around a low pressure center
 - circulation around a high pressure center
- _____ 29. Buys-Ballot's law states that, "In the Northern Hemisphere if you stand with your back to the surface wind, then turn clockwise about 30°, lower pressure will be _____."
- to your right
 - to your left
 - behind you
 - in front of you
- _____ 30. We can generally expect the air to be _____ above areas of surface low pressure and _____ above areas of surface high pressure.
- rising, rising
 - rising, sinking
 - sinking, sinking
 - sinking, rising

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Answer Section

MULTIPLE CHOICE

1. B
2. D
3. C
4. B
5. A
6. C
7. A
8. B
9. D
10. C
11. B
12. A
13. B
14. A
15. E
16. C
17. C
18. B
19. B
20. B
21. C
22. B
23. B
24. E
25. D
26. C
27. C
28. C
29. B
30. B

B 8. C 17. C 26.

 B 1. D 9. B 18. C 27.

 D 2. C 10. B 19. C 28.

 B 20. B 29.

 C 3. B 11.

 C 21. B 30.

 B 4. A 12.

 B 22.

 A 5. B 13.

 A 14.

 B 23.

 C 6.

 E 15. E 24.

 A 7. C 16.

 D 25.